XXII.—*Note on a Bear* (Ursus savini, *sp. n.*) *from the Cromer Forest-bed.* By C. W. Andrews, D.Sc., F.R.S. (British Museum, Natural History).

(Published by permission of the Trustees of the British Museum.)

The occurrence of the remains of bears in the Norfolk Forest-bed series has long been known. In 1846 Owen, in his 'British Fossil Mammals and Birds,' described the mandible of a large bear from high up in the series at Bacton, and referred it to *Ursus spelæus*. This specimen, which was in the Green Collection, is now in the British Museum (16448). Numerous authors have since written upon the subject, and a summary of their various views is given by E. T. Newton in his 'Vertebrata of the Fossil Bed Series of Norfolk and Suffolk' (1882), p. 5. Here he points out that the Forest-bed bears have been referred to four species—*Ursus spelæus*, *U. arvernensis*, *U. etruscus*, and *U. priscus*,—but that, except in the case of the first-named species, there is no published record of the material upon which these determinations were based.

Mr. Newton himself was able to examine some fifteen specimens, mostly lower jaws, and, with three exceptions, he refers all these to *Ursus spelæus*. The exceptions are a maxilla which he regards with some certainty as belonging to *Ursus ferox-fossilis* (= *U. priscus* = *U. horribilis*). This specimen, which is labelled "*U. prisous*" in Falconer's handwriting, is figured by Newton (*op. cit.* pl. i. fig. 5). It seems just possible that it may belong to the ordinary Forest-bed Bear. The other specimens referred doubtfully to *Ursus ferox-fossilis* are a left ulna and a second metacarpal.

Having recently had occasion to examine most of the bear-remains in the British Museum, I paid particular attention to the Forest-bed bear, because it always seemed improbable that a Pliocene form should be identical with a late Pleistocene species, the associate of *Elephas primigenius* and *Rhinoceros antiquitatis*. The material upon which the conclusions here arrived at are based includes not only the specimens described by Mr. Newton and those belonging to the Savin Collection in the British Museum, but also a quantity of bear-remains collected in recent years by Mr. Savin, of Cromer, and now kindly lent by him for the purposes of this paper.

The material now available for examination includes about

sixteen mandibular rami of varying degrees of completeness, two maxillæ with molars, numerous odd teeth, and a number of more or less perfect limb-bones. The result of my examination of these remains is that I have come to the conclusion that the common bear of the Cromer Forest-bed is specifically distinct from the typical *Ursus spelæus*, though it certainly belongs to the same (Spelæarctine) group, and may, perhaps, represent the ancestral form. I suggest that this new species should be called *Ursus savini*, sp. n., in honour of Mr. Savin of Cromer, whose untiring zeal in collecting the Forest-bed fossils is well known.

I propose to take as the type-specimen the right mandibular ramus (16448) from Bacton described and figured by Owen in 'British Fossil Mammals and Birds' (1846), p. 89, fig. 35 *c* (p. 106); also by E. T. Newton in 'Vertebrata of the Forest-bed Series' (1882), pl. i. figs. 1, 1 *a*. The fourth premolar is also figured by Reynolds in 'British Pleistocene Mammalia' (Mon. Pal. Soc. 1906), pl. vi. fig. 6 *c*.

The dimensions of this specimen (in millimetres) are:—

Length of jaw	260
Depth of jaw between m_2 and m_3	57
Height at coronoid process	112
Length of diastema	app. 37
M_3, length 24, width 16.	
M_2, „ 25, „ 16.	
M_1, „ 25, „ 12.	
Pm_4, „ 16, „ 10.	
Length of molar series (M_1–M_3)	75
Length from m_3 to canine	app. 125
Canine: long diameter of base of crown	25
„ short „ „ „	17

It is not denied that *U. savini*, though smaller, resembles *U. spelæus* in some important points—*e. g.*, (1) in the loss of the anterior premolars (in one case pm_1 is present); (2) in the tendency towards the complication of the crown of pm_4 by the development of an inner cusp, which, however, is by no means always present; (3) in the complication of the crowns of the molars through the development of numerous accessory tubercles. On the other hand, it differs in (1) the relatively smaller size of the cheek-teeth in proportion to the jaw; (2) in the shorter diastema between pm_4 and the canine; (3) in the more slender form of the latter tooth, especially in the region of its root; (4) the smaller size of the posterior lobe of the last lower molar compared to the anterior lobe.

The degree of complication of pm_4 is very variable; in

some specimens the inner cusp is not much developed, as in the tooth from Bacton (16448) figured by Reynolds (pl. vi. fig. 6 *c*), and still less in another specimen (M 6190) from Sidestrand; on the other hand, in a specimen (M 5995) figured by Reynolds on the plate just quoted (fig. 6 *a*), the complication is much greater, but in no case does it approach that seen in the normal pm_4 of the Pleistocene *Ursus spelæus*.

In both *Ursus spelæus* and *U. savini* the mandibular rami of some old individuals, probably males, may become much deepened beneath the posterior molars. This is especially marked in one very massive mandibular ramus (M 6186) from Bacton; in this case, however, this peculiarity may have been partly due to a diseased condition. This deepening of the posterior part of the mandibular ramus is well shown in a specimen from Overstrand (Savin Coll. M 6079) figured by E. T. Newton (*op. cit.* pl. i. fig. 3). In younger individuals, particularly in the smaller, probably female, jaws, the lower border of the ramus is nearly straight.

Another bear with which *Ursus savini* must be compared is *U. deningeri* from the older Pleistocene sands of Mosbach and Mauer. This species has been described in great detail by v. Reichenau [Abhandl. Geol. Landesanstalt Darmstadt, Bd. iv. (1901–8) p. 208], and its relationships to other species, especially to the Forest-bed bears and *U. spelæus*, have been discussed by Freudenberg [Palæon. Abhandl. Bd. xvi. (1913–14) p. 582]. The latter author, though at first inclined to regard *U. deningeri* as identical with the common Forest-bed species (*U. savini*), later in his paper states that it is really different in several respects. The chief differences are:— (1) in *U. deningeri* pm_4 is always a narrow cone without the inner tubercle, which is often more or less developed in *U. savini*; (2) in *U. savini* the third lower molar, though similar in general outline, is broader in proportion to its length, a peculiarity still more marked in m_2–pm_4. In one specimen of *Ursus deningeri* pm_3 is present.

From his table of average measurements of the teeth in *U. savini*, *U. deningeri*, and *U. spelæus*, Freudenberg believes that *U. savini* is intermediate between *U. spelæus* and *U. deningeri*; but the more extensive series of measurements now available shows that, so far as the dimensions of the teeth go, *U. deningeri* and *U. savini* are very similar. Nevertheless, the differences in structure already referred to and the difference of date seem to justify the separation of the two forms

here adopted. Freudenberg considers that probably both *U. deningeri* and *U. savini* are derived from *U. etruscus* or some related form, and that *U. savini* may be the ancestor of *U. spelæus*.

Among the specimens lent by Mr. Savin there is also a right maxilla of a small bear which is of great interest. The canine, pm^1, m^1, and m^2 are present, and the socket for a small pm^3. It is peculiar for the great depth of the maxilla between the antorbital foramen and the cheek-teeth, and the animal must have had a very short deep muzzle. It is much too small to fit any of the mandibles preserved, but at the same time the teeth show the complex tuberculation characteristic of the Spelæarctine group, so that it may indicate the existence of very small individuals of *U. savini*. The teeth are quite unlike those of *U. arvernensis*.

The dimensions of the teeth in this specimen (in millimetres) are:—

Canine, length at base of crown 18, width at base of crown 15.
Pm^1, length 17, width 12.
M^1, „ 25, „ 17.
M^2, „ 36·5, „ 18.

Too much importance must not be attached to this specimen, as it seems to be much restored; but if it actually belongs to a small *Ursus savini*, it indicates that that animal had a deep skull with a short muzzle, which agrees with the short diastema in the mandible.

A number of limb-bones are preserved: these, especially the tibia, indicate that this species was a heavily built short-legged animal. In *Ursus spelæus* also the limbs are relatively short.

A left maxilla of a very large bear is included among the specimens lent by Mr. Savin (no. 745, Overstrand). The two molars are well preserved, but somewhat worn; these dimensions are: m^1, length 30 mm., width 21; m^2, length 50 mm., width 23·5. The posterior lobe of m_2 is remarkably long and narrow; the tuberculation of the crowns of the molars seems to have been less complex than usual in *Ursus spelæus*. It is just possible that this maxilla may belong to a very large individual of *U. savini*, but it is far too large to be associated with any of the mandibles in the Collection; possibly it belongs to the bear referred to by Newton as *Ursus ferox-fossilis* (?). More material is necessary before any certain determination is possible.